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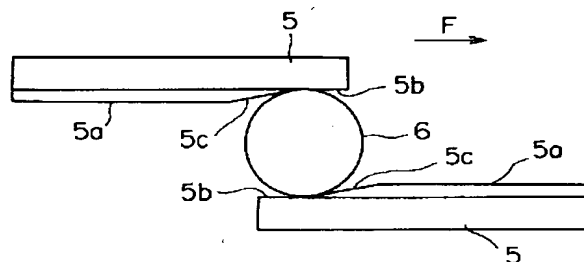
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(54) 【発明の名称】 右, 左ねじの転造方法

(57) 【要約】

【課題】 ねじの転造は品質のよいねじを効率よく製造することができるが、右, 左ねじを高精度に転造する技術がなかった。

【解決手段】 平板5の表面に、相互に交差する右ねじと左ねじを平面状に展開した平面状ねじ山5aを形成し、表面を内側に向けて平行に相対する一対の平板5の間に円柱状材料6を挿入し、平板5を移動して平面状ねじ山5aを円柱状材料6に食い込ませ、円柱状材料6に右ねじと左ねじを螺設する。



【特許請求の範囲】

【請求項 1】 平板の表面に、相互に交差する右ねじと左ねじを平面状に展開した平面状ねじ山を形成し、前記表面を内側に向けて平行に相対する 1 対の平板の間に円柱状材料を挿入し、該円柱状材料を挟圧しながら少なくとも一方の前記平板を移動して、前記円柱状材料の外周面に相互に交差する右、左ねじを螺設することを特徴とする右、左ねじの転造方法。

【請求項 2】 前記平板の平面状ねじ山は、外周面に右ねじと左ねじを重ねて螺設したマスターねじを前記平板に押しつけて転動することにより形成され、形成後に表面硬度を高くする加工が施されることを特徴とする請求項 1 記載の右、左ねじの転造方法。

【請求項 3】 前記平板の平面状ねじ山には、前記円柱状材料が挿入される側に不完全ねじ山部が形成され、前記平板の移動により不完全ねじ山部につながる完全ねじ山部が前記円柱状材料の外周面を挟圧することを特徴とする請求項 1 又は 2 記載の右、左ねじの転造方法。

【請求項 4】 前記右ねじと左ねじは、ねじピッチおよびねじ外径、ねじ有効径が異なることを特徴とする請求項 1 又は 2 記載の右、左ねじの転造方法。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、止めナットの緩み防止などに使用される右、左ねじを製造する転造方法に関するものである。

【0002】

【従来の技術】ボルトに螺合したナットは、ナットの締付け力により生じるねじの締付け軸力の摩擦抵抗によりナットは緩むことなく締付け力を保持しているが、ボルトの軸まわり、軸直角方向の外部からの振動や衝撃を受けたときにナットが緩み回転し易く、ナットが緩むと部品の締付け軸力（予張力）が失われ、ねじ締結体の機能を失う、すなわち、ねじの緩みを生じることになる。ねじ締結体は予張力を失うと、ボルトが疲労破壊する確率が高くなり、ねじ締結体の信頼性を著しく低下させる。このねじの緩みを防止するために、ボルトにナットを締結した後に止めナットでバックアップする方法がある。

【0003】締付けられた止めナットは、既に締付けられているナットの上（着座していない方の面）に圧接し、止めナットのねじフランク面はボルトの正常な圧力面の反対側のフランク面を押圧することとなり、2 個のナットが圧接面を介して引っ張り合った状態になる。これによって、ねじ締結体の外からの軸直角方向或いは軸まわりに作用する力に対してナットが緩み方向に回転するのを防ぐ。

【0004】しかし、外部からボルトの軸直角方向或いは軸まわりの大きな大きな振動や衝撃を受ける場所では、ナットと止めナットが緩み方向に一体となって回転するため、ねじ締結体の信頼性は万全ではない。止めナ

ットの緩みを防止するために、ボルトに止めナットを締付けた後に、ボルトと止めナットに割ピンや綴り線を貫通する方法があるが、組み立て工数が増加する欠点や、点検や分解修理後に止めナットを増し締めができないなどの欠点がある。

【0005】このような欠点を解決する方法として、ボルトの外周面の同じ位置に右ねじと左ねじを重ねて螺設し、この右、左ねじに右ねじナットと左ねじナットを螺合して締付ける方法がある。右ねじナットと左ねじナットは緩み方向が反対であるので、緩み方向に一体となって回転する恐れは無く、右ねじナットと左ねじナットの接触面が相互の緩み方向の回転を阻止するので、激しい振動や衝撃を受ける場所に使用することができる。

【0006】

【発明が解決しようとする課題】ボルトに右、左ねじを螺設するには、旋盤などで一方のねじを旋削した後に他方のねじを旋削する方法があるが、旋盤などによるねじ加工はねじの転造方法に比較して多大な加工時間がかかる欠点があり、しかも、右、左ねじを別々に加工するために加工時間が倍加されるので、極めて非効率である。また、転造ねじでは、表面の加工硬化層がねじ山の表面に対して平行に形成されるので、ねじの強度が増加される利点がある。

【0007】かかる理由から、相互に交差する右ねじと左ねじを有するねじを転造する方法が研究されてきた。一般のねじの転造では、外周面にねじを螺設した一対の転造ロールを所定間隔を隔てて配設して同一方向に回転し、その間に挿入した円柱状材料に転造ロールのねじを転写することができるが、右ねじと左ねじを有するねじの転造では、このような転造ロールを使用することができない。

【0008】そこで、図 3 に示すように、表面に右ねじを平面状に展開した平面状ねじ山 1 a を有する平板 1 と、表面に左ねじを平面状に展開した平面状ねじ山 2 a を有する平板 2 を、相互の表面を内側に向けた状態で所定間隔を挟んで平行に配設し、平板 1 及び 2 のうちの一方、或いは双方を、平板 1、2 の表面に平行に移動可能に設ける。

【0009】平板 1、2 の表面の間には、円柱状材料 3 を挿入可能な間隔が形成され、平板 1、2 の一側に平面状ねじ山 1 a、2 a の不完全ねじ山部 1 b、2 b が形成される。不完全ねじ山部 1 b、2 b を円柱状材料 3 に接触させた後に、平板 1 及び 2 の一方を移動させると（或いは、双方を反対方向に移動させると）、円柱状材料 3 が転動しながら、不完全ねじ山部 1 b、2 b につながる平面状ねじ山 1 a、2 a に挟圧されて塑性変形し、平板 1 の平面状ねじ山 1 a と、平板 2 の平面状ねじ山 2 a がそれぞれ転写される。

【0010】かくして、円柱状材料 3 に右ねじ及び左ねじを転造することはできたが、平板 1 の平面状ねじ山 1

a が転写されるねじ山部分と、平板 2 の平面状ねじ山 2 a が転写されるねじ山部分が相互に干渉し、成形された右、左のねじ山に形状不良が生じるので、この転造方法は実用的でなかった。本願発明は、この転造方法の問題点の究明する過程で新規の着想を思い付き、試作研究の結果右、左ねじの転造に成功したものである。

【0011】

【課題を解決するための手段】上記目的を達成するために、本発明の右、左ねじの転造方法は、平板の表面に、相互に交差する右ねじと左ねじを平面状に展開した平面状ねじ山を形成し、前記表面を内側に向けて平行に相対する 1 対の平板の間に円柱状材料を挿入し、該円柱状材料を挟圧しながら少なくとも一方の前記平板を移動して、前記円柱状材料の外周面に相互に交差する右、左ねじを螺設することを特徴とするものである。

【0012】前記平板の平面状ねじ山は、外周面に右ねじと左ねじを重ねて螺設したマスターねじを前記平板に押しつけて転動することにより形成され、形成後に硬度を高くする熱処理加工を施すことにより製作することができる。前記平板の平面状ねじ山には、前記円柱状材料が挿入される側に不完全ねじ山部が形成され、前記平板の移動により不完全ねじ山部につながる完全ねじ山部が前記円柱状材料の外周面を挟圧するように構成するとよい。また、前記右ねじと左ねじは、ねじピッチおよびねじ外径、ねじ有効径が異なるようにすることができる。

【0013】

【発明の実施の形態】以下、発明の実施の形態の具体例を、マスターねじの製作方法、平板の製作方法、円柱状材料から右、左ねじの転造方法の順に説明する。ダイヤモンドのドレッシングで砥石の外周面にねじ山のプロファイルを上上げ、この砥石により高質材料の外周面にねじ山のプロファイルをもつクラッシングロールを研磨、成形する

【0014】このクラッシングローにより、ねじ山の連続したプロファイルを持つねじ研磨用砥石を成形し、高硬度の工具鋼材から成る円柱状のマスター素材の外周面の同じ場所に、右ねじ用砥石と左ねじ用砥石で、それぞれ右、左のねじ面を研削加工を行ってマスターねじを完成する。

【0015】完成されたマスターねじを工具鋼材から成る平板状の素材の表面に押付けて、平板状の素材の表面に右、左のねじを食い込ませ、マスターねじを回転させて平板状の素材をマスターねじの接線方向に移動し、或いは平板状の素材を移動させることによりマスターねじを回転させ、平板状の素材の表面に、相互に交差する右ねじと左ねじを平面状に展開した平面状ねじ山が形成される。

【0016】平板状の素材の表面の一側に、あらかじめマスターねじの食い込み量より僅かに大きい寸法だけ低くなった基準面を設け、基準面の端部から平板状の素材

の表面につながるテーパ面を設けておくと、基準面は、右ねじと左ねじが転写されない平面となり、テーパ面には、平板状の素材の表面に向かって次第に高くなる不完全ねじ部が形成される。次に、平板状の素材の表面を焼き入れして高硬度の転造用の平板 5 (図 1 参照) を完成する。

【0017】以上のように製作された 2 個の平板 5 を、平面状ねじ山 5 a を有する表面を内側に向けた状態で、所定間隔を挟んで平行に配置し (図 1 参照)、一方の平板 5 を固定し、他方の平板 5 を平行移動可能に設ける。或いは、両方の平板 5 を相互に反対方向に向けて平行移動可能な構造としてもよい。移動前の両平板 5 は、相互の基準面 5 b が相対する位置にあり、基準面 5 b から不完全ねじ部 5 c を介して平面状ねじ山 5 a がつながる。

【0018】以上のように構成された転造装置で右、左ねじを転造するには、両平板 5 の基準面 5 b に間に円柱状材料 6 を入れ、図 1 において上側の平板 5 を矢印 F 方向に平行移動すると (或いは、両平板 5 を相互に反対方向に移動すると)、不完全ねじ部 5 c に挟まれた円柱状材料 6 が同方向に移動し、平面状ねじ山 5 a に挟圧されて塑性変形し、外周面に右ねじ 7 a と左ねじ 7 b が同時に転造されたねじ (ボルト) 7 が形成される (図 2 参照)。

【0019】右ねじ 7 a と左ねじ 7 b は同時に転造されるので、従来のように、一方の平板で転造されたねじ面が他方の平板でねじ転造される加工歪みを受けることがなくなり、正確なねじ山形状を転造することが可能になった。

【0020】右ねじ 7 a のねじピッチと左ねじ 7 b のねじピッチを同一としないで、例えば右ねじ 7 a を並目ねじとし、左ねじ 7 b を細目ねじとすると、右ねじ 7 a の山頂に左ねじ 7 b が浅く形成された状態になり、右ねじ 7 a の強度は殆ど失われないので、右ねじ 7 a に螺合するナットで部品を強力に緊締し、左ねじ 7 b に螺合する細目ねじのナットを止めナットとして使用することができる。又、この逆も可能である。

【0021】

【発明の効果】本発明は、以上のように構成されているので、一般の右、左ねじ (或いは、一方を一般のすきま嵌めねじとし、他方をしまり嵌めねじとした右、左ねじ) を高精度に効率よく転造することが可能になった。

【図面の簡単な説明】

【図 1】本発明の右、左ねじ転造方法の説明用略図である。

【図 2】転造された右、左ねじの一例を示す正面図である。

【図 3】従来の課題を説明するための説明用略図である。

【符号の説明】

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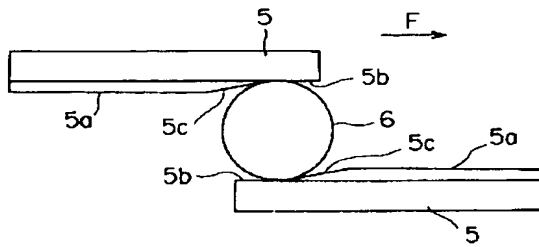
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5 a 平面状ねじ山
 5 b 基準面
 5 c 不完全ねじ山

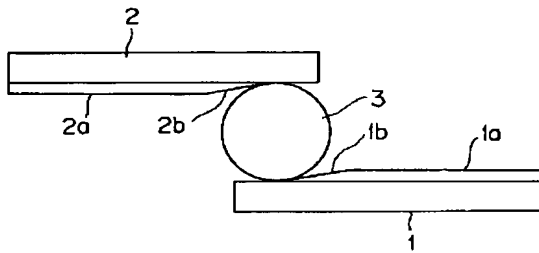
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円柱状材料
 右, 左ねじ付きのボルト

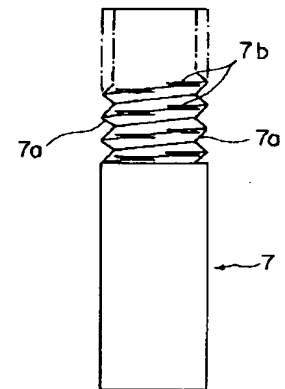
【図 1】



【図 3】



【図 2】



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PATENT ABSTRACTS OF JAPAN

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20

(54) FORM ROLLING METHOD OF RIGHT AND LEFT SCREWS

(57)Abstract:

25 PROBLEM TO BE SOLVED: To efficiently achieve the form rolling of right and left screws with high accuracy by forming a flat thread in which right and left screws across each other are developed flat on a surface of a flat plate, and moving the flat plate while columnar material is held between a pair of flat plates parallel to and opposite to each other with the surface facing inward.

SOLUTION: A flat thread on a flat plate is form-rolled by pressing against the flat plate a master thread which is provided on an outer circumferential surface with a right screw and a left screw in a lapped condition, and manufactured through the heat treatment to increase the hardness after form rolling. Thus manufactured two flat plates 5 are arranged parallel to each other with the specified interval with a surface having the flat thread 5a facing inwardly, one flat plate 5 is fixed, and the other flat plate 5 is provided in a parallel-transporting manner. A columnar material 6 is placed between reference surfaces 5b of the flat plates 5, and when the upper flat plate 5 is parallel-translated in the direction of the arrow F, a screw (bolt) in which the right and left screws are simultaneously form-rolled on the outer circumferential surface of the material 6 held incomplete thread parts 5c.

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25 [Date of extinction of right]

[Claim(s)]

[Claim 1] one pair of Taira which forms in a monotonous front face the plane screw thread which developed to the plane the right-handed screw which crosses mutually, and the left-handed screw, turns said front face inside, and faces in parallel -- the
5 rolling approach of the right which inserts a cylindrical ingredient in a wooden floor, moves one [at least] of said plate, compressing this cylindrical ingredient, and intersects the peripheral face of said cylindrical ingredient mutually, the right which are characterized by to screw a left-handed screw on, and a left-handed screw.

[Claim 2] Said monotonous plane screw thread is the rolling approach of the right
10 according to claim 1 characterized by performing processing which is formed by forcing on a peripheral face a right-handed screw and master **** which screwed the left-handed screw on in piles at said plate, and rolling, and makes surface hardness high after formation, and a left-handed screw.

[Claim 3] The right according to claim 1 or 2 characterized by the perfect screw thread
15 section which the imperfect screw thread section is formed in the side by which said cylindrical ingredient is inserted in said monotonous plane screw thread, and is connected with the imperfect screw thread section by said monotonous migration compressing the peripheral face of said cylindrical ingredient, the rolling approach of a left-handed screw.

20 [Claim 4] Said right-handed screw and left-handed screw are the rolling approach of the right according to claim 1 or 2 characterized by a pitch and a **** outer diameter differing from a **** effective diameter, and a left-handed screw.

[Detailed Description of the Invention]

25 [0001]

[Field of the Invention] This invention relates to the right used for slack prevention of a lock nut etc., and the rolling approach of manufacturing a left-handed screw.

[0002]

[Description of the Prior Art] Although it binds tight without a nut loosening with the

frictional resistance of the bolting axial tension of **** which produces the nut screwed in the bolt according to the bolting force of a nut and the force holds , if it loosens and is easy to rotate a nut and a nut loosens when the vibration and the impact from the outside of the direction of an axial right angle are get , the bolting axial tension
5 (beforehand tension) of components will be lose the circumference of the shaft of a bolt , the function of a **** conclusion object loses , namely , the slack of **** will be produce . The probability a bolt carries out [a probability] fatigue breaking will become high, and a screw-thread conclusion object will reduce the dependability of a **** conclusion object remarkably, if tension is lost beforehand. In order to prevent the
10 slack of this screw thread, after concluding a nut in a bolt, the method of backing up with a lock nut is.

[0003] The pressure welding of the lock nut bound tight is carried out to the top face (field of the direction which has not sat down) of the nut already bound tight, the screw-thread flank side of a lock nut will press the flank side of the opposite side of the
15 normal pressure surface of a bolt, and two nuts will be in a **** flare ***** condition through a pressure-welding side. It prevents a nut rotating in the direction of slack by this to the force of acting on the circumference of the direction of an axial right angle of a from, or a shaft outside a **** conclusion object.

[0004] However, since a nut and a lock nut are united and rotate in the direction of slack, the dependability of a **** conclusion object is not thoroughgoing in the location
20 which gets a big, big vibration and the big, big impact of the circumference of the direction of an axial right angle of a bolt, or a shaft from the exterior. Although the approach of penetrating a split pin and a spelling line is in a bolt and a lock nut after binding a lock nut tight in a bolt in order to prevent the slack of a lock nut, the fault of
25 tightening being unable to do a lock nut is after the fault, the check, and decomposition repair which the number of assemblers increases.

[0005] As an approach of solving such a fault, a right-handed screw and a left-handed screw are screwed on the location where the peripheral face of a bolt is the same in piles, and there is the approach of screwing and binding a right-handed-screw nut and

a left-handed-screw nut tight to this right and a left-handed screw. Since there is no possibility of rotating in one in the direction of slack since a right-handed-screw nut and a left-handed-screw nut have the opposite direction of slack and the contact surface of a right-handed-screw nut and a left-handed-screw nut prevents rotation of the mutual direction of slack, it can be used for the location which gets an intense vibration and an intense impact.

[0006]

[Problem(s) to be Solved by the Invention] In order to screw the right and a left-handed screw on a bolt, after machining **** of one side with an engine lathe etc., the method of machining **** of another side is, but since floor to floor time is doubled in order for **** processing with an engine lathe etc. to have the fault which requires great floor to floor time as compared with the rolling approach of **** and to process the right and a left-handed screw separately moreover, it is non-efficiency very much. Moreover, in a rolled thread, since a surface work-hardening layer is formed in parallel to the front face of the screw thread, there is an advantage from which the reinforcement of **** is increased.

[0007] The approach of carrying out rolling of the right-handed screw which crosses mutually, and the **** which has a left-handed screw from this reason has been studied. Although **** of a rolling roll can be imprinted in the rolling of a common screw thread into the cylindrical ingredient which separated and arranged predetermined spacing, rotated in the same direction, and inserted between them the rolling roll of the pair which screwed **** on the peripheral face, such a rolling roll cannot be used in the rolling of a right-handed screw and **** which has a left-handed screw.

[0008] Then, as shown in drawing 3 , the plate 1 which has plane screw thread 1a which developed the right-handed screw on the front face at the plane, and the plate 2 which has plane screw thread 2a which developed the left-handed screw on the front face at the plane are arranged in parallel on both sides of predetermined spacing, where a mutual front face is turned inside, and one side of the plates 1 and 2 or both

sides is established in the front face of plates 1 and 2 movable in parallel.

[0009] Spacing which can insert the cylindrical ingredient 3 is formed between the front faces of plates 1 and 2, and imperfect screw thread section 1b of the plane screw threads 1a and 2a and 2b are formed in the 1 side of plates 1 and 2. If one side of plates
5 1 and 2 is moved after contacting imperfect screw thread section 1b and 2b into the cylindrical ingredient 3 (or) If both sides are moved to an opposite direction, while the cylindrical ingredient 3 rolls, it will be compressed by the plane screw threads 1a and 2a connected with imperfect screw thread section 1b and 2b, and will deform plastically, and plane screw thread 1a of a plate 1 and plane screw thread 2a of a plate 2 will be
10 imprinted, respectively.

[0010] Although rolling of a right-handed screw and the left-handed screw was able to be carried out to the cylindrical ingredient 3, since the threadpiece by which plane screw thread 1a of a plate 1 is imprinted, and the threadpiece by which plane screw thread 2a of a plate 2 is imprinted interfered mutually and the defect of shape arose in
15 the screw thread of the fabricated right and the left in this way, this rolling approach was not practical. The invention in this application thinks of a new idea in the process which the trouble of this rolling approach studies, and succeeds in the rolling of the right and a left-handed screw as a result of prototype research.

[0011]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the right of this invention, and the rolling approach of a left-handed screw The plane screw thread which developed to the plane the right-handed screw which crosses mutually, and the left-handed screw is formed in a monotonous front face. one pair of Taira which turns said front face inside and faces in parallel -- it is characterized by inserting a
20 cylindrical ingredient in a wooden floor, moving said one [at least] plate, compressing this cylindrical ingredient, and screwing on the right which intersects the peripheral face of said cylindrical ingredient mutually, and a left-handed screw.

[0012] Said monotonous plane screw thread is formed by forcing on a peripheral face a right-handed screw and master ***** which screwed the left-handed screw on in piles at

said plate, and rolling, and can be manufactured by performing heat treatment processing which makes a degree of hardness high after formation. It is good for said monotonous plane screw thread to constitute so that the perfect screw thread section which the imperfect screw thread section is formed in the side in which said cylindrical ingredient is inserted, and is connected with the imperfect screw thread section by said monotonous migration may compress the peripheral face of said cylindrical ingredient. Moreover, said right-handed screw and left-handed screw can differ from each other in a pitch and a **** outer diameter, and a **** effective diameter.

[0013]

[Embodiment of the Invention] Hereafter, the example of the gestalt of implementation of invention is explained in order of the rolling approach of the right and a left-handed screw from the manufacture approach of master ****, the monotonous manufacture approach, and a cylindrical ingredient. [0014] which grinds the crushing roll which has the profile of the screw thread in the peripheral face of a grinding stone, and has the profile of the screw thread in the peripheral face of the nature ingredient of high with finishing and this grinding stone, and is fabricated with the dressing of a diamond The grinding stone for **** polish which has the profile which the screw thread followed by this crushing low is fabricated, with the grinding stone for right-handed screws, and the grinding stone for left-handed screws, a grinding process is performed for the die face of the right and the left, respectively in the location where the peripheral face of the master material of the shape of a cylinder which consists of the tool steel material of a high degree of hardness is the same, and master **** is completed in it.

[0015] Completed master **** is forced on the front face of the plate-like material which consists of tool steel material. Make **** of the right and the left eat into the front face of a plate-like material, rotate master ****, and a plate-like material is moved to the tangential direction of master ****. Or by moving a plate-like material, master **** is rotated and the plane screw thread which developed to the plane the right-handed screw which crosses mutually, and the left-handed screw is formed in the front face of a plate-like material.

[0016] The incomplete thread which serves as a flat surface where, as for datum level, a right-handed screw and a left-handed screw will not be imprinted if the taper side which prepares the datum level where only the slightly larger beforehand dimension than the amount of interlocking of master **** became low at the 1 side of the front
5 face of a plate-like material, and is connected with the front face of the edge of datum level to a plate-like material is established, and becomes gradually high toward the front face of a material plate-like to a taper side is formed. Next, the front face of a plate-like material is quenched and the plate 5 (refer to drawing 1) for the rolling of a high degree of hardness is completed.

10 [0017] Where the front face which has plane screw thread 5a for two plates 5 manufactured as mentioned above is turned inside, on both sides of predetermined spacing, it arranges in parallel (refer to drawing 1), one plate 5 is fixed, and the plate 5 of another side is formed possible [a parallel displacement]. Or both plates 5 are mutually turned to an opposite direction, and it is good also as structure in which a
15 parallel displacement is possible. Both the plates 5 before migration are in the location where mutual datum-level 5b faces, and plane screw thread 5a is connected through incomplete-thread 5c from datum-level 5b.

[0018] In order to carry out rolling of the right and the left-handed screw with the rolling equipment constituted as mentioned above If the cylindrical ingredients 6 are
20 paid to datum-level 5b of both the plates 5 in between and the parallel displacement of the upper plate 5 is carried out in the direction of arrow-head F in drawing 1 (or) If both the plates 5 are mutually moved to an opposite direction, the cylindrical ingredient 6 inserted into incomplete-thread 5c moves in this direction, and it will be compressed by plane screw thread 5a, and will deform plastically, and the **** (bolt) 7
25 by which rolling of right-handed-screw 7a and the left-handed-screw 7b was carried out to the peripheral face at coincidence will be formed (refer to drawing 2).

[0019] Since rolling of right-handed-screw 7a and the left-handed-screw 7b was carried out to coincidence, receiving processing distortion to which thread rolling of the die face by which rolling was carried out with one plate is carried out with the plate of

another side like before was lost, and it became possible to carry out rolling of the exact screw thread configuration.

[0020] Without making the same the pitch of right-handed-screw 7a, and the pitch of left-handed-screw 7b For example, if right-handed-screw 7a is made into a coarse screw thread and left-handed-screw 7b is made into the fine thread, since left-handed-screw 7b will be shallowly formed in the summit of the mountain of right-handed-screw 7a and most reinforcement of right-handed-screw 7a will not be lost Components can be powerfully bound with the nut screwed in right-handed-screw 7a, and the nut of the fine thread screwed in left-handed-screw 7b can be used as a lock nut. Moreover, this reverse is also possible.

[0021]

[Effect of the Invention] Since this invention was constituted as mentioned above, it became possible to carry out rolling of the general right and the left-handed screw (or the right, left-handed screw which made one side general clearance *****, it was closed, inserted in another side and were considered as ****) efficiently with high precision.

[Brief Description of the Drawings]

[Drawing 1] They are the right of this invention, and the schematic drawing for explanation of the left-handed-screw rolling approach.

[Drawing 2] They are the right by which rolling was carried out, and the front view showing an example of a left-handed screw.

[Drawing 3] It is the schematic drawing for explanation for explaining the conventional technical problem.

[Description of Notations]

5 Plate

5a Plane screw thread

5b Datum level

5c Imperfect screw thread

6 Cylindrical Ingredient

7 Right, Bolt with Left-handed Screw

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